



## RESEARCH SEMINAR

Wednesday May 22, 2013  
1-2 pm

ICT 3101



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### Artificial Intelligence and Data Mining in Energy Networks

Australia's electricity networks are changing. After a century of providing predictable and controllable power from a small number of centralised sources, Australia is now integrating pseudo-stochastic and intermittent renewable generation and moving towards an ever-more decentralised grid. The change has led to a growing acceptance that computational intelligence approaches can not only reveal more about the way our electricity networks behave today, but also about how we may plan them for the future. In this seminar, we will explore an example of both: the National Feeder Taxonomy Study and the Network Planning Tool.

The National Feeder Taxonomy Study draws on data mining methodologies and a rich data set provided by Australia's distribution network service providers to identify a concise set of representative electricity network feeders. This work represents the first time that a national study of Australian distribution feeders has been executed and will provide researchers, engineers and students alike a view into what our Australian electricity network really looks like and how it really behaves.

The prototype CSIRO Network Planning Tool draws on contemporary artificial intelligence optimisation approaches, power-flow simulation and distributed resource models to plan the selection and placement of distributed generation and storage technologies in Australian electricity networks. This decision support tool explores the trade-offs between key decision-making goals (such as minimisation of financial cost and maximisation of environmental performance) through multiobjective optimisation, models steady-state voltage profiles, captures line losses, facilitates the exploration of uncontrolled renewables on grid performance across multiple scenarios and quantifies the effect of integrating energy storage technologies.

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